intellectual world. Men will arise who, like him, will advance and extend scientific knowledge by research and exposition, but rarely will the qualities of the investigator and interpreter be combined with a more charming personality.

The funeral has been fixed to take place at Marylebone Cemetery this afternoon, at 2.30 o'clock.

NOTES.

AMONG the honours which Lord Rosebery recommended on leaving office, and which the Queen has approved, we notice that Dr. Robert Giffen, C.B., whose work in various departments of statistical science will be known to our readers, has become K.C.B., and that Prof. J. W. Judd has been appointed C.B. Mr. James Blyth, the well-known agriculturist, has received a baronetcy, Colonel V. D. Majendie, C.B., has been promoted to K.C.B., and Captain Lugard has been appointed C.B.

THE International Meteorological Committee, at its last meeting at Upsala, in August 1894, recommended that an International Conference of the same character as that of Munich in 1891, should be held at Paris about the middle of September, probably September 15, 1896. A circular has just been distributed among meteorologists, announcing that M. Mascart has undertaken to make the arrangements necessary for the meetings of the conference. Mr. R. H. Scott will be glad to receive, at the Meteorological Office, notes on any questions suitable for insertion in the programme for the conference. It is proposed that the definitive programme shall be prepared before the end of the present year 1895, in order to give meteorologists interested in the subjects proposed for discussion, time to formulate their views thereon.

THE death is announced of Prof. D. Kirkwood, for many years Professor of Mathematics in Indiana State University, and known for his investigations of the orbits of planets and comets.

AN influential committee has been formed in Paris, to collect funds for the erection of a monument to Francis Garnier, the explorer. The Treasurer of the Committee is M. J. Rueff, 43 rue Taitbout, Paris.

PROF. FUCHS has been elected a Correspondant of the Paris Academy of Sciences, in the Section of Geometry; Dr. Nansen has been elected a Correspondant of the Section of Geography and Navigation, and Dr. Laveran a Correspondant of the Section of Medicine and Surgery.

PROF. WILD has formally announced the resignation of his office at St. Petersburg as from September 13. His future residence will be at Zurich, and he requests that papers and books hitherto addressed to him at St. Petersburg, should be sent to his new address.

THE subject of the essays for the Howard Medal of the Royal Statistical Society, to be awarded in 1896, with £20 as heretofore, is "School Hygiene, in its Mental, Moral, and Physical Aspects." Essays should be sent in on or before June 30, 1896.

PROF. C. LLOYD MORGAN has accepted an invitation to deliver four lectures in the Columbia University Biological Course next winter. His subject will be "Some Habits and Instincts of Birds." Mr. Frank M. Chapman, of the American Museum of Natural History, will also give four lectures upon birds, from the zoologist's standpoint.

THE American Museum Expedition of 1895 has already completed the exploration of the Uinta basin fossil fauna, and established the fact that, like the *Phosphorites* of France, it is completely transitional between the Eocene and Miocene. The party is now passing north to explore Brown's Park on the eastern base of the Uinta Mountains, an ancient lake basin which has been long known but hitherto unexplored for fossils.

THE Executive of the Midland Union of Naturalists at their annual meeting, held on Monday last at Oxford, awarded to Mr. Walter E. Collinge, Assistant-Lecturer in Zoology and Comparative Anatomy, Mason College, Birmingham, the "Darwin Medal" for his recent researches on the cranial nerves and sensory canal system of fishes.

MR. GEORGE S. DAVIS, who, since January 1885, has at a very heavy loss maintained the "Index Medicus," announces he will be obliged to discontinue that very useful publication, owing to insufficient support. It would hardly be to the credit of medical societies, and scientific workers generally, if this indispensable monthly index is allowed to come to an end for want of something like £400 a year.

THE fortieth annual exhibition of the Royal Photographic Society will be inaugurated on Saturday, September 28, by a private view, followed in the evening by a conversazione. The exhibition will remain open daily (Sundays excepted) from September 30 until November 14. Medals will be placed at the disposal of judges for the artistic, scientific, and technical excellence of photographs, lantern slides, and transparencies, and for apparatus. The judges for the technical section are Captain W. de W. Abney, Mr. Chapman Jones, and Mr. Andrew Pringle.

AN International Exhibition of Hygiene, organised under the direction of M. Brouardel, was opened at Paris on Thursday last. The exhibits are divided into five groups, referring respectively to (1) the hygiene of private houses; (2) city hygiene; (3) the prophylactics of zymotic diseases, demography, sanitary statistics, &c.; (4) the hygiene of childhood, including alimentary hygiene, questions of clothing, and physical exercises; (5) industrial and professional hygiene.

THE *Weekly Weather Report* of the 29th ult. shows that the rainfall for the first half of this year is much below the average in all districts except the north-east of England. The deficiency varies from 2·5 inches in the east of Scotland, to 5 inches in the south-west of England, but in the west of Scotland the deficiency amounts to 12 inches. Some heavy amounts have, however, been measured recently; at Churchstoke, Montgomery, the abnormally large fall of 4·83 inches was recorded on the 26th ult.

A FEW days ago, the Lord Mayor of Liverpool, on behalf of the Museum Committee of the Corporation (of which Sir William B. Forwood is chairman), opened in the Public Museum, in presence of a numerous assembly, a large new gallery exclusively devoted to ethnography. An interesting account of the origin and history of the collection, and of the method of its arrangement, was given by Dr. H. O. Forbes, the Director of Museums. The African, Papuan, and New Zealand sections are especially rich, while those of Mexico, Peru, and Patagonia contain some very rare exhibits of exceptional value.

AT the annual general meeting of the Society of Arts, the following gentlemen were elected Vice-Presidents:—Sir Edward Birkbeck, Mr. B. Francis Cobb, the Hon. Sir Charles W. Fremantle, Sir Douglas Galton, and Prof. W. C. Roberts-Austen. To fill the places vacated by retiring members of Council, there were elected, at the same meeting, Sir Steuart Colvin Bayley, Major-General Sir Owen Tudor Burne, Mr. R. Brudenell Carter, and Dr. Francis Elgar. Sir Frederick Bramwell was elected Treasurer of the Society.

The following recent appointments are announced in *Science*. To be assistant professors in Johns Hopkins University: Dr. C. Lane Poor, astronomy; Dr. A. S. Chessin, mathematics and mechanics; Dr. Simon Flexner, pathology; Dr. Albert Mann to be professor of biology in Ohio Wesleyan University. In Syracuse University, Dr. E. C. Quereau to be professor of geology and mineralogy, and Dr. W. H. Metzler associate professor of mathematics. Mr. M. A. Mackenzie has been appointed professor of mathematics in Trinity University, Toronto. The chair of physics in the University of California, recently filled by the late Prof. Harold Whiting, has been offered to Dr. E. P. Lewis.

A novel engineering scheme in the construction of the foundation of the retaining wall of the new speedway at High Bridge, in New York City, is the freezing of a bed of quicksand which impeded the work. A row of 4-inch pipes have been sunk a few feet apart, to the depth of 40 feet. These pipes are capped at the bottom, and inside them are inserted smaller pipes, open at the bottom. Cold air is forced from a condenser through the smaller pipes into the larger, and thence returned to the condenser. The air is cooled by expansion to a temperature of about -45° C., thus freezing the surrounding mud and wet sand, and checking the flow into the excavation.

Those who have read Prof. Crum Brown's "Robert Boyle" Lecture, reported in our columns (vol. lii. p. 184), will be interested to learn that among the "Studies from the Princeton Laboratory," contributed to the current number of the *Psychological Review*, there is a paper on "Sensations of Rotation," by Mr. H. C. Warren. The particular object of this investigation was to determine the relative influence of sight and the internal sense of rotation on the subjective estimate of movement. By means of a mirror—which could be inserted or removed at will—the apparent motion, as given to sight, could be reversed. For the detailed results the paper itself must be consulted. In general they seem, we are told, to favour the view that the semicircular canals constitute the organ for the sense of rotation.

The Meteorological Office has received from the Central Physical Observatory of St. Petersburg, copies of a circular addressed to various institutions with reference to a proposed meteorological exhibit at Nizhny-Novgorod Exhibition in 1896. The Central Physical Observatory being desirous of making this exhibit as complete as possible, and at the same time of making known to the Russian public the progress of meteorological science in various countries, desires to obtain information on any of the following points:—(1) Number of stations, of different orders. (2) Titles of periodical publications, any of which will be exhibited. (3) Summary of practical applications of meteorology, with titles of any works on the subject. (4) Copies of works containing mean values or references to them, instructions for taking observations, descriptions of instruments with methods of exposure, and charts referring to maritime meteorology.

The autumn meeting of the Iron and Steel Institute will be held at Birmingham from Tuesday to Friday, August 20-23. The programme will embrace visits to the leading industrial establishments in and around Birmingham. The Mayor of Birmingham will hold a reception, at the City Council House and Art Gallery, on the evening of August 20. The Earl and Countess of Warwick will also give a reception at Warwick Castle. Among the papers that are expected to be read are:—"The Thermo-chemistry of the Bessemer Process," by Prof. W. N. Hartley, F.R.S.; "The Hardening of Steel," by H. M. Howe; "The Mineral Resources of South Staffordshire," by H. W. Hughes; "On Tests of Cast Iron," by W. J. Keep and by T. D. West; "The Estimation of Oxide of Iron in Steel," by A. E. Tucker; "The Use of Nickel in the Metallurgy of Iron," by H. A. Wiggin.

Prof. Kikuchi, of the Science College, Tōkyō, is preparing a short life of the late Prof. Cayley, to be accompanied by a photograph, for a Japanese popular scientific monthly, viz. the "Tōyō Gakugu Zasshi."

A remarkable system of electric lights on buoys has just been completed at the Gedney Channel, off Sandy Hook. This channel is only 1000 feet wide, and vessels have not heretofore been able to pass through it by night. The new system, however, provides a brilliant thoroughfare, lighted by ten incandescent lights of 100 candle-power each, and each on a buoy, about 50 feet long, and rising 12 feet out of water. The cable which conveys the electricity carries the pressure of 1000 volts under water, and is six and half miles long, being the longest cable in the world carrying a high-pressure current under water, and also the only one of its kind ever made. It consists of a copper conductor, insulated with gutta-percha, bedded in jute, and sheathed with hard drawn copper wire. The machines have an output of only 100 volts, but the current flows through a step-up converter, back of the switchboard, where it is converted into the required voltage, thus being perfectly safe to operate.

The palæontological department of the American Museum has recently secured by purchase the entire collection of fossil mammals of North America brought together by Prof. E. D. Cope since 1870. This includes 552 of Prof. Cope's mammalian types, besides the unique single skeletons of Phenacodus, Hyracotherium and Hyrachyas, and the rich series from all formations described and figured in Cope's Tertiary Vertebrata, besides all his unpublished material. This famous collection, together with the others which are rapidly coming in from the annual western expeditions to the Rocky Mountain region, will be arranged in the large new hall upon the geological floor of the Museum, which has been designed and cased for the purpose. The collections are being prepared for exhibition and research as rapidly as possible.

By the kindness of Mr. R. H. Scott, we are able to print the following information received at the Meteorological Office with reference to some recent earthquake disturbances in the Leeward Islands. The note was drawn up by Mr. F. Watts, the Government Analytical Chemist at Antigua, and was sent to the Colonial Office with two letters on the effects of the earthquake in Barbuda. "On Monday, May 20, 1895, a long and somewhat severe earthquake shock was felt in Antigua at 4.44 p.m. This shock threw down a steel rod 4 inches long and $\frac{1}{8}$ inch in diameter, in a rough earthquake indicator at Skerretts. Slight shocks followed at intervals. I was able to ascertain that there were at least seven shocks between 4.44 and 8.20 p.m. A shock at 6.58 p.m. was rather severe, causing one of the Cathedral bells to sound slightly and stopping the clock. Slight shocks have been experienced almost every day since. Similar shocks are reported from Montserrat, Nevis, St. Kitts, and Barbuda. Some injury to buildings is reported from Barbuda, but I am unaware of the extent of the damage. It is stated that distant sounds, as of explosions, were heard in Barbuda; these appear to have been heard in a northerly direction. Through the courtesy of the Telegraph Company, I am informed that these earthquakes have not been felt in any islands save those in the groups Antigua, Montserrat, Nevis, St. Kitts, Barbuda. From this fact, coupled with the report of noises heard in Barbuda, I should infer that these disturbances are purely local, and in no way related to the earthquakes in Europe about the same time."

An elaborate investigation on the bacterial contents of margarine and margarine-products has been recently made by Messrs. Jolles and Winkler. It is satisfactory to find, in view of the large quantities of margarine which are placed on the market in one form or another, that it is considerably freer from microbes than ordinary butter when the latter is not made with Pasteurised cream. Whereas butter contains an average of from 10 to 20 millions of microbes per grm., margarine-butter yields but from 4 to 6 millions; moreover, whilst in extreme cases as many as 47 millions of microbes have been found per grm. in butter, margarine can only boast of at most something over 11 millions. Cold appears to act more prejudicially on margarine microbes than it does on butter germs; thus in one case a reduction from 6½ millions to 230,200 per grm. was observed in margarine, whilst a similar exposure never succeeds in eliminating more than one-third of those present in butter, according to Lafar. It is reassuring to learn that in none of the numerous samples examined were pathogenic bacteria discovered; many of the ordinary microbes present were isolated and described, and amongst these two were found which the authors believe are closely associated with rancid processes which occur in old samples of margarine. To further reduce the microbial population of margarine butter, it is suggested that only sterile milk and sterile water should be used in its manufacture from oleo-margarine, which is considerably poorer in bacterial life than the finished product.

In the years 1891 and 1892, the Norwegian Government fitted out a vessel for the purpose of making temperature observations round the Lofoden Islands, with the view of tracing the connection between the habits of the cod and the temperature of the water, and the Parliament voted a sum of money for the purchase of thermometers for registering the temperature at various depths. We have received from Lieutenant G. Gade, who was entrusted with the investigation, a pamphlet entitled "Temperaturmaalinger i Lofoten," which contains an interesting account of the results obtained. He found that at the same places the temperature sometimes increased regularly according to the depth, while at others there were two distinct strata of water, the cold being uppermost. Although the vertical variations of temperature may have been considerable, yet he always found an increase with depth. The favourite temperature of the cod is supposed to be 5° C., and while in January 1892 this was found at the surface, in March 1891 it was only found at a depth of 160 metres; the greatest depth at which fishing takes place is 200 metres, where 6°–7° C. were recorded nearly constantly from January to the middle of April. Lieutenant Gade found that when there were two strata of water, one cold (2°–3° C.) uppermost, and one warmer (5°–7° C.) below, the cod was always found in the warmer stratum; but, as the fishing takes place at depths where the temperature is from 4°–7° C. or more (and the depths where these temperatures are found are very different), the author considers that the fisherman cannot derive practical advantage from temperature observations alone.

Chorisis, or the doubling of the parts, is by no means a rare occurrence in flowers. In this phenomenon there appear, apparently in the place of one floral leaf, especially a stamen, two such leaves either collaterally, *i.e.* beside one another, or serially, above one another. These pairs of leaves may arise either out of a single common primordium, or directly from the axis. Up to the publication of a paper on "Das Reductionsgesetz der Blüthen," by Dr. Lad. J. Čelakovský (Stzb. der königl. böhmischan Ges. der Wissenschaften), morphologists agreed in regarding chorisis as the division or branching of an originally simple leaf. Dr. Čelakovský, however, comes to the following conclusions, amongst others, after a very complete consideration of a large number of instances. Normal chorisis occurs not as a division of a single leaf, but rather as a fusion, or at least an approximation of distinct and originally uniformly separated leaves. In the ontogeny of the plant this may occur as a branching or positive chorisis, as he terms it, of a single primordium, but this fact does not afford, according to him, a clue to the steps in the phylogenetic development, by which the present state has come about; but he believes, in opposition to the hitherto received opinion, that the present condition in these flowers was attained by negative chorisis or approximation. Normal chorisis is the expression of an incomplete transition from a state in which the individual leaves composing a whorl or whorls were more numerous, into one in which they are less numerous. It is, in fact, the resultant of two tendencies—one, the older, to polymerism, and the other and newer, to oligomerism. The reduction so effected is always governed by the law of the alternation of the consecutive leaf-whorls. Dr. Čelakovský's paper is one of great interest, and the discussion as to the origin of the various types of andrœcium will no doubt be specially useful to those who are interested in the affinities of the natural orders of dicotyledons and monocotyledons.

The publishers of *Knowledge* announce that Dr. Isaac Roberts, F.R.S., will shortly continue in that magazine his selection of photographs of stars, star-clusters, and nebulæ. The series is intended to be in continuation of Dr. Roberts's work, "A Selection of Photographs of Stars, Star-Clusters, and Nebulæ," recently published, and which has contributed very largely to the extension of the knowledge of astronomical phenomena.

The July number of *Natural Science* is devoted to brief descriptions of the results of the *Challenger* Expedition, from the points of view of investigations in many branches of knowledge. Each of the contributors, all of whom write with authority upon their respective subjects, more or less confines himself to answering the question, "How has the *Challenger* Expedition advanced science?" The brief summaries thus obtained form a very valuable and compact index to the advances in various fields of natural knowledge due to the Expedition.

The additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*, ♀) from India, presented by Mr. John Norbury, Junr.; a Macaque Monkey (*Macacus cynomolgus*, ♂) from India, presented by Mr. H. W. Ball; a Black-eared Marmoset (*Hapale pencillata*) from South-east Brazil, presented by Mr. H. P. Roberts; a Rough Fox (*Canis rudis*) from British Guiana, presented by Dr. Irvine K. Reid; a Grey Ichneumon (*Herpestes griseus*) from India, presented by Lady Champion de Crespigny; seven Black Salamanders (*Salamandra atra*), a Slowworm (*Anguis fragilis*) from Switzerland, presented by the Rev J. W. Horsley; a Burchell's Zebra (*Equus burchelli*, ♂) from South Africa, a Common Rhea (*Rhea americana*) from South America, deposited; two Black-necked Swans (*Cygnus nigricollis*) from Antarctic America, three Blue Snow Geese (*Chen cœrulescens*) from Alaska, purchased; a Thar (*Capra jemlaica*, ♀), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

Variable Stars.—Dr. Chandler has completed a revised supplement to his well-known second catalogue of variable stars; together they furnish a complete list of known variables, comprising in all 344 stars. Some little difficulty has been experienced in connection with the southern variables, on account of the want of accurate positions and certain identifications in some cases. Dr. Chandler especially shows a want of confidence in the data relating to the variables discovered photographically at the Boyden station of the Harvard College Observatory at Arequipa,; but considering the pressing need of a definitive nomenclature, and relying on the assurances of Prof. Pickering, most of these objects have been included in the catalogue and letters assigned to them.

All the recent observations made by the South African ob-